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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/680,513	10/06/2000	Takahiro Horikoshi	198322US2CONT	9594

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EXAMINER

BROWN, KHALED

ART UNIT PAPER NUMBER

2877

DATE MAILED: 08/12/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/680,513

Applicant(s)

HORIKOSHI ET AL.

Examiner

Khaled Brown

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4,14-21,23,24,28-35,40-42,44-46,49-52 and 54-85 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,4,14-21,23,24,29-35,40-42,44-46,49-52,54-63,66,67,69,70,72-74 and 77-85 is/are rejected.
- 7) ☒ Claim(s) 28,64,65,68,71,75 and 76 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 October 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 14,15,23,46,50,58,73,74,85 are rejected under 35 U.S.C. 102(e) as being anticipated by Takahashi (US 6163365).

Re clm 14: Takahashi discloses an exposure method to illuminate a mask with exposure light from a light source and transfer a pattern of the mask onto a substrate through an optical system, said method comprising:
setting time intervals for measurement (Col 7 lines 47-51) in respect to at least two exposure conditions for transferring said pattern of said mask onto said substrate (Col 6 lines 12-15), each of said time intervals for measurement being different from one another (time intervals “once per day or once per two days” are different from one another), in consideration of a transmittance of said optical system (the time intervals for measurement, refers to the times at which a measurement of the transmittance of the optical system is being made Col 7 lines 47-51, and thus this is being done “in consideration of a transmittance of said optical system”, since it is the transmittance of the optical system that is the measured result) that changes depending on each of the

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at least two exposure conditions (Col 6 lines 10-15, the transmissivity of the optical system is said to change "in accordance with" three different exposure conditions....namely "the integrated light quantity per unit time", "the aperture area of the masking blade", "or "the transmissivity of the reticle") ; setting one exposure condition of said at least two exposure conditions (Col 6 line 14 "transmissivity of the reticle"); and measuring the amount of said exposure light which passes through said optical system and reaches onto said substrate at said time interval for measurement that corresponds to said set exposure condition (Col 6 lines 12-15).

Re clms 15,85: a transmittance of a mask (Col 6 line 14)

Re clms 23,74: measured before passing through the optical system (performed by 10) and measurement result ...passing through the optical system (performed by 11)

Re clms 50,58: a device manufacturing method including a lithographic process (Col 10 lines 27-63)

Re clm 73: illumination optical system (3) and projection optical system (8)

Re clm 46: Takahashi discloses an exposure apparatus to transfer a pattern illuminated with exposure light from a light source onto a substrate through an optical system, said exposure apparatus comprising: a measurement unit to measure an amount of exposure light passing through said optical system and reaching onto said substrate at a predetermined time interval (10); a selection unit to select any exposure condition among a plurality of exposure conditions for transferring said pattern onto said substrate (26); and a control unit to change said time interval of said measurement unit in accordance with said any exposure condition selected by said selection unit (13).

Claims 16-18, 19-21,29,30-33,44, 45,51,52,56,57,63,62,66,67,77,78,83,84 are still rejected under 35 U.S.C. 102(e) as being anticipated by Taniguchi (US 5721608). Re clms 16-18,51, 77,78: Taniguchi discloses an exposure method to transfer a pattern illuminated with exposure light from a light source onto a substrate through an optical system, said method comprising: performing a first measurement of an amount of said exposure light passing through said optical system (Col 21, Col 22 line 38 "sampling timing t1"), performing a second measurement of an amount of said exposure light passing through said optical system at a predetermined time interval after said first measurement of the amount of said exposure light (Col 21, Col 22 line 59 "sampling timing t2"): comparing the amount of said exposure light obtained by said first measurement and the amount of said exposure light obtained by said second measurement (Col 21 lines 34-37, the measured values are averaged and therefore this implies comparing the two values) and obtaining a time interval for measurement for measuring an amount of said exposure light passing through said optical system in third and succeeding measurements in accordance with the comparison result (Col 21, Col 22 lines 59-64 "sampling timing t3-t5").

Re clms 19,20,21,45,52,63: Taniguchi discloses an exposure method (Col 13-20) performed by an exposure apparatus to transfer a pattern illuminated with exposure light from a light source onto a substrate, said method comprising: photo detecting a part of said exposure light (Col 13 lines 62-63) in an optical path of said exposure light (1L); setting a time interval (Col 14 line 9) for measurement of a transmittance of said

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optical system (R, PL) which is arranged between a position of photo detecting (28) a part of said exposure light and said substrate (W) in accordance with changes in exposure conditions; measuring a transmittance (Col 13 line 51) of said optical system at said set time interval for measurement; setting an exposure amount control target value (Col 24 line 37) in accordance with said measured transmittance of said optical system; and transferring said pattern onto said substrate (Col 6 line 5-10) through said optical system, while an exposure amount is controlled based on photo detection results of a part of said exposure light and said set exposure amount control target value (Col 14 lines 58-67) and a self cleaning (inherently occurs when transmittance measurement is made prior to exposure of a wafer), device manufactured (W) and a prediction function (Taniguchi Col 14 line 55) is disclosed.

Re clm 29: a control unit (Taniguchi 100), an exposure amount setting unit (Taniguchi 1), an exposure amount control system (Taniguchi 29) are disclosed and performs as noted above.

Re clm 30: measurement prior to exposure (Taniguchi Col 13 line 55)

Re clm 31: measurement after to exposure (Taniguchi Col 15 line 23-33)

Re clms 32, 33: first sensor (Taniguchi 28), second sensor (Taniguchi 41), transmittance/control unit (Taniguchi 100)

Re clms 44,56: a branch optical system is disclosed (Taniguchi 7a, 7b), a measurement/control unit (Taniguchi 100) are disclosed and performs as noted above.

Re clm 57: a branch optical system is disclosed (Taniguchi 7a, 7b), a measurement/control unit (Taniguchi 100).

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Re clm 62: light intensity (Taniguchi Col 13 line 39)

Re clm 66: correcting said transmittance time-varying prediction function (Taniguchi Col 14 line 48)

Re clm 67: precision (Taniguchi Col 24 line 37)

Re clm 83: operation is stopped (Taniguchi Col 11 lines 61-67)

Re clm 84: time (Taniguchi Col 12 line 5), intensity (Taniguchi Col 2 line 55), amount (Taniguchi Col 12 line 4)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1,4-5, 24,34,35,40-42,49,54,55,59,60,61,69,70,72,79-82 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi (US 6163365).

Re clms 1, 34,35,70,72,81: Takahashi discloses an exposure method to transfer a pattern of a mask illuminated with exposure light from a light source onto a substrate through an optical system, the method comprising: setting a time interval for measuring of a transmittance of the optical system, measuring a transmittance of the optical system (Col 7 lines 47-66);

setting an exposure condition (Col 6 lines 10-15 ,“the integrated light quantity per unit time”, “the aperture area of the masking blade”, or “the transmissivity of the reticle”),

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setting an exposure amount control target value in accordance with the measured transmittance of the optical system and transferring the pattern onto the substrate through the optical system (Col 7 lines 3-10), while an exposure amount is controlled based on a photo detection result of a part of the exposure light photo detected between the light source and the mask and the set exposure amount control target value (Col 5 lines 24-27). However, Takahashi does not specifically disclose changing the time interval for measurement. Takahashi teaches that a time interval for measurement can be either once per day or once per two days (Col 7 lines 48-51) because it allows a substrate to be exposed with a correct amount of exposure (Col 2 line 9). Therefore it would have been obvious to a person of ordinary skill in the art at the time the invention was made to change the time interval for measurement from either once per day to once per two days because it would allow a substrate to be exposed with a correct amount of exposure as taught by Takahashi. Of course any change in the time interval for measurement would be in consideration of a transmittance of said optical system (the time intervals for measurement, refers to the times at which a measurement of the transmittance of the optical system is being made Col 7 lines 47-51, and thus this is being done "in consideration of a transmittance of said optical system", since it is the transmittance of the optical system that is the measured result) that changes depending on the exposure condition (Col 6 lines 10-15, the transmissivity of the optical system is said to change "in accordance with" three different exposure conditions....namely "the integrated light quantity per unit time", "the aperture area of the masking blade", "or "the transmissivity of the reticle")

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Re clms 4,82: transmittance of a mask (Col 6 line 14)

Re clm 5: exposure amount (Col 5 line 26)

Re clms 49,54,55: a device manufacturing method including a lithographic process (Col 10 lines 27-63)

Re clm 59: light branched away (Col 5 lines 22-23) and an optical system (7,8 Col 5 lines 30-37)

Re clm 60: most recent transmittance measurement (Col 6 lines 18-19) and measurement before most recent transmittance measurement (Col 5 lines 47-52)

Re clms 40,69: illumination optical system (3) and projection optical system (8)

Re clm 41: drive unit (Col 4 line 39)

Re clms 24, 42,61,79: Takahashi discloses the claimed invention (Fig 4) except for individual elements forming a transmittance measurement unit, a control unit, an exposure amount setting unit and an exposure amount control system as claimed. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the single main control (13) of Takahashi which is disclosed as performing all the claimed functions of the individual elements claimed (as noted above) in order to ensure a wafer receives a correct exposure amount, since it has been held that constructing a formerly integral structure in various individual elements involves only routine skill in the art. *Nerwin v. Erlichman*, 168 USPQ 177, 179

Re clm 79: ratio (Col 7 line 56)

Re clm 80: mask (integrated light quantity Col 6 line 12), modified illumination (performed by element 2).

Allowable Subject Matter

Claims 28,64,65,68,71,75,76 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: the prior art of record fails to disclose or suggest a reading unit or the time interval is based on the number of substrates all in conjunction with the rest of the claimed subject matter.

Response to Arguments

Applicant's arguments filed 7-14-03 have been fully considered but they are not persuasive. With respect to claims 1,14,24, and 46 applicant argues that Takahashi does not disclose a time interval for transmittance measurement is changed in consideration of a transmittance of an optical system. However, Takahashi does disclose a time interval for transmittance measurement is changed in consideration of a transmittance of an optical system (Col 7 lines 48-51) and of course any change in the time interval would be in consideration of a transmittance of the an optical system since the time interval is for the measurement of a transmittance of the an optical system. With respect to claims 16, 29 and 44 applicant argues that Taniguchi does not disclose an amount of exposure light obtained by a first measurement and an amount obtained by a second measurement are compared and such that a time interval for measurement for measuring an amount of exposure light is obtained in accordance with the

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comparison result. However, Taniguchi does disclose an amount of exposure light obtained by a first measurement (t1) and an amount obtained by a second measurement (t2) are compared (Col 21 line 36 "averaged") and such that a time interval for measurement for measuring an amount of exposure light is obtained in accordance with the comparison result (t3).

With respect to claims 19 and 45 applicant argues that Taniguchi does not disclose a time-varying prediction function is determined in consideration of a predetermined condition in which a self-cleaning is performed. However, Taniguchi does disclose a time-varying prediction function is determined (Col 14 line 55) in consideration of a predetermined condition (Col 14 lines 62-66 "luminance Ip") in which a self-cleaning is performed (Inherently the light source will clean the optical system as noted above).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Tanimoto et al 4701606 and Nishi et al 5894341.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khaled Brown whose telephone number is 703-306-5738. The examiner can normally be reached on M-F 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank G. Font can be reached on 703-308-4881. The fax phone numbers

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for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1782.

KB
August 7, 2003


Frank Font
Supervisory Patent Examiner
Art Unit 2877